

Sanitation in meat production

Prof Ockerman 1960's 2X2 slides originally
constructed in the 60's

Some of script was added in 2015

The Ohio State University

To evaluate sanitation and
to see if progress of
reducing contamination is
effective counting of
microorganisms become
necessary

A. Preparation of media and equipment



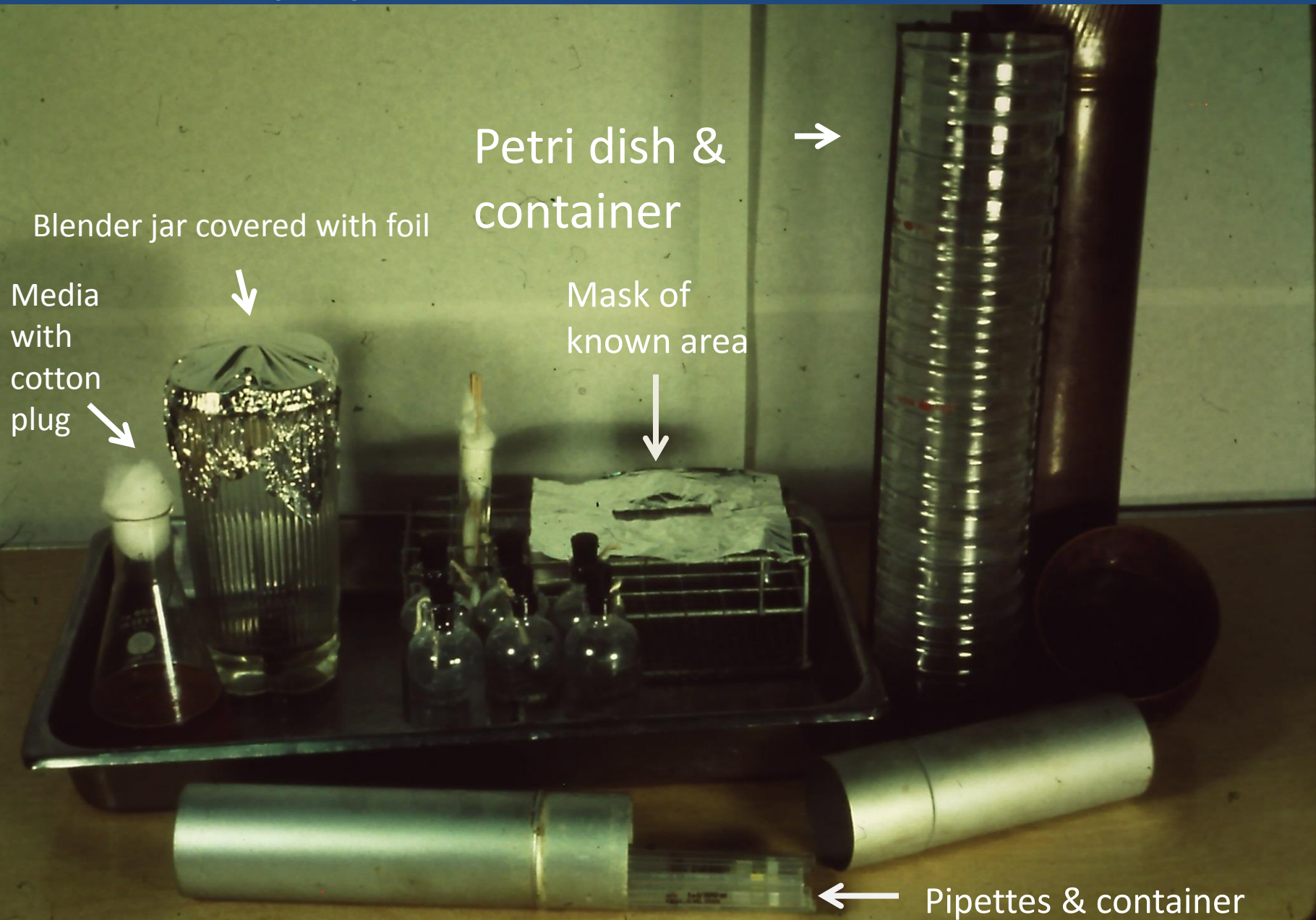
Weighing Media

A photograph of a laboratory setup. A 250 ml Erlenmeyer flask containing a yellow liquid is placed on a magnetic stirrer. A spoon is positioned at the top of the flask, adding a white substance. The stirrer has a control panel with two knobs. The background is a yellow wall and a red surface.

Adding Media to
water

←
Stirrer

Micro Equipment



Placing equipment and
media in a pressure
autoclave for
sterilization

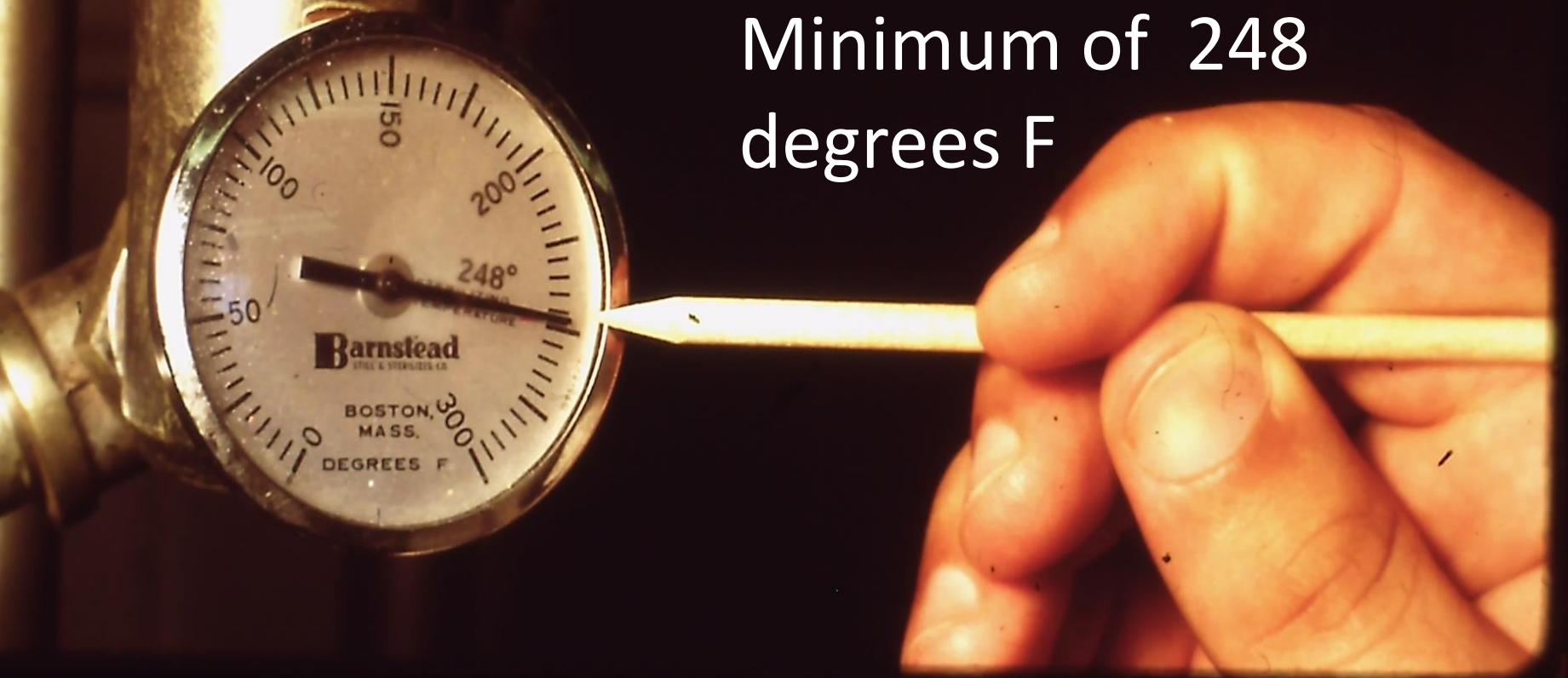




Minimum of
15 psi

Temperature

Minimum of 248
degrees F





MINIMUM 15 MINUTES

Removing sterilized equipment
and media from autoclave



B. SAMPLING METHODS

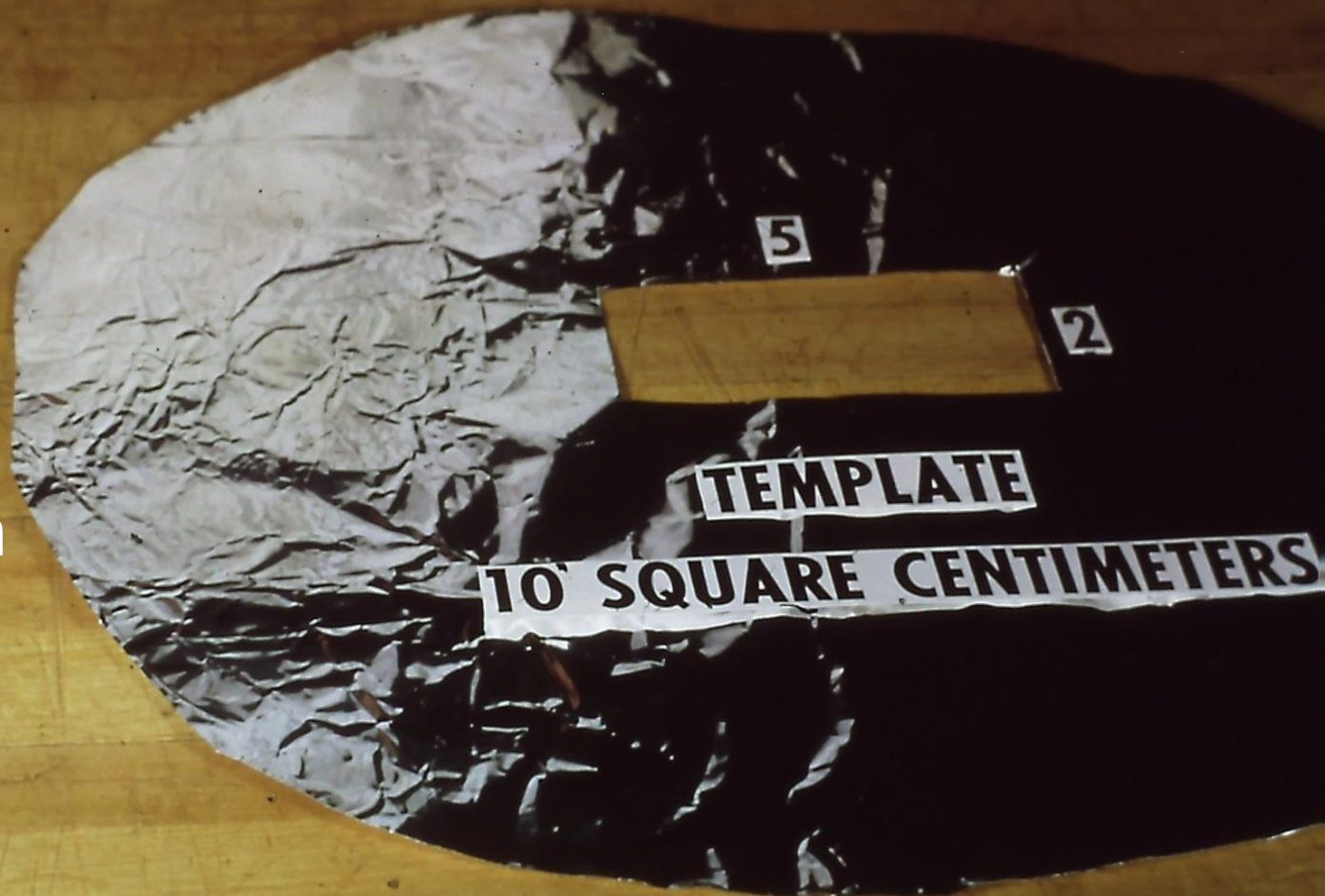
- 1. Surface Sample**
- 2. Solid Sample**
- 3. Liquid Sample**
- 4. Air Sample**
- 5. Contact Sample**

1

Examples of surface sampling

Sampling a specific area of known dimensions usually hard surfaces

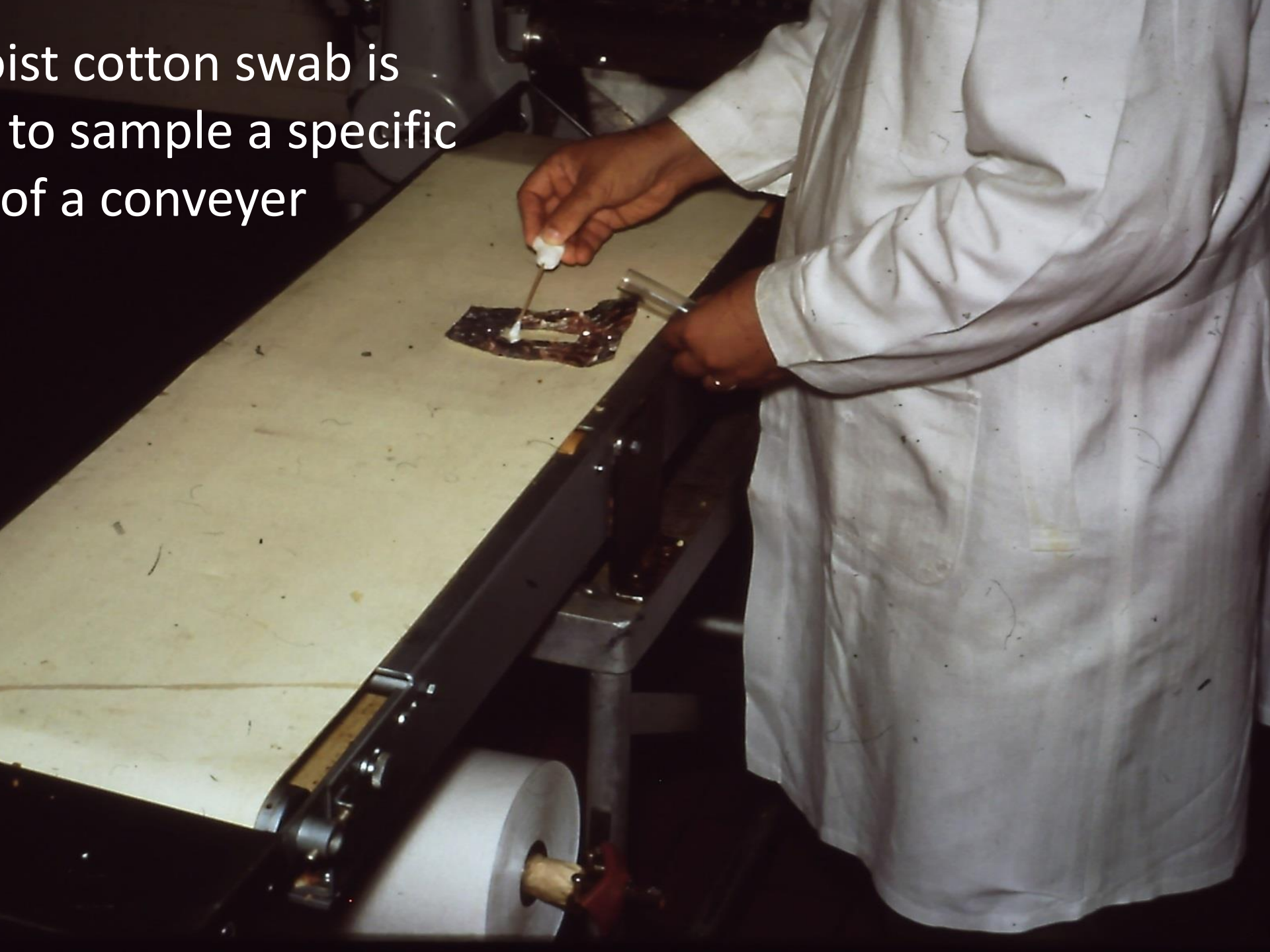
A moist cotton swab is used to collect micro-organisms in the selected area





Moist cotton swab
is used sample a specific
known area of a meat tub

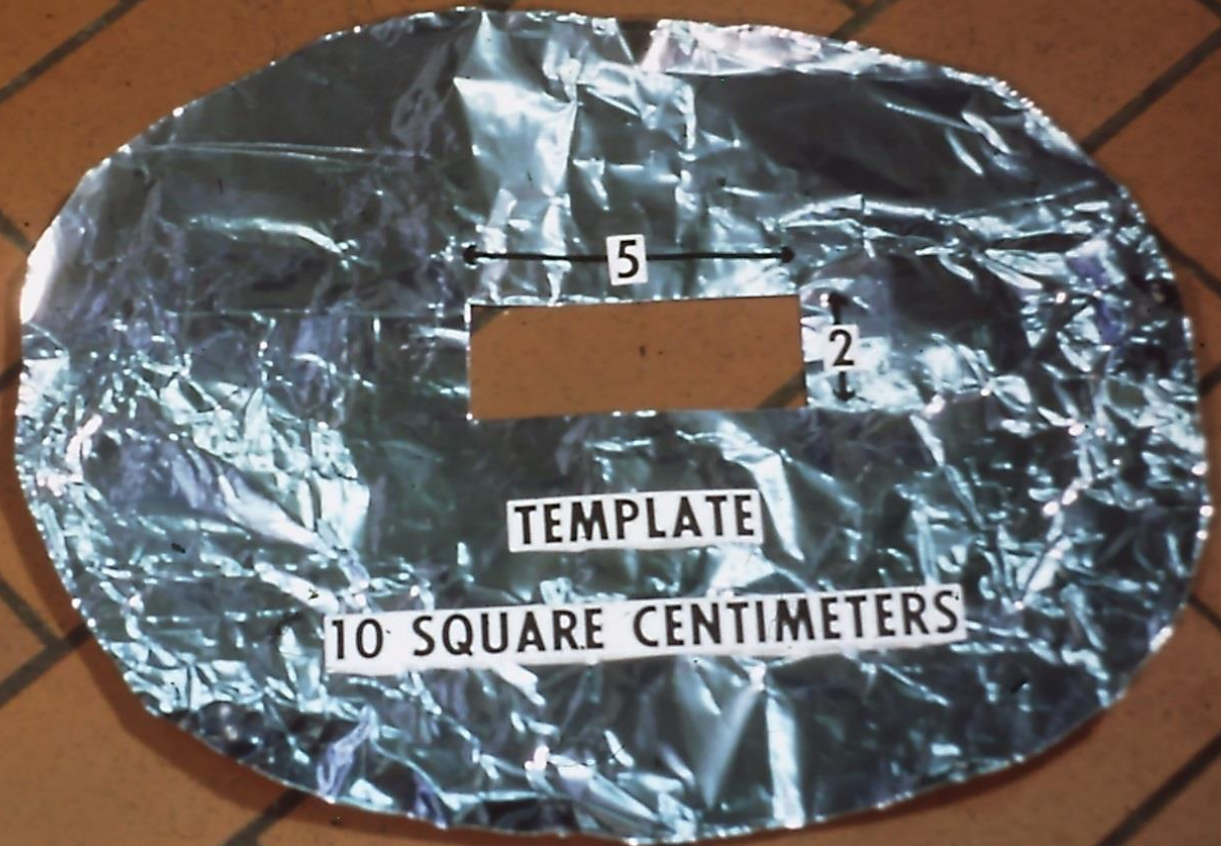
dist cotton swab is
to sample a specific
of a conveyer





A moist cotton swab is used to sample a specific area of a turkey dinner plate

A moist cotton swab is used to sample a specific area of the floor



dist cotton swab is used to sample a specific
of urinal



A moist cotton swab is used to sample a specific known dimension area of hand wash station



2

Sampling of a Product

A Specific weight of a mixed and ground is obtained for micro analysis



A photograph showing a person's hands using a pair of tweezers to place small, thin slices of cold cut meat onto a white paper square. The paper square is resting on the weighing pan of a mechanical laboratory scale. The scale has a vertical column with a balance arm and a horizontal beam with weights. To the left of the scale is a metal tool with a long, cylindrical handle and a circular base. In the background, there are more slices of cold cut meat on a white surface. The text "COLD CUTS" is overlaid on the bottom center of the image.

COLD CUTS

A Specific weight of a cold cut is obtained for micro. analysis



STEAK

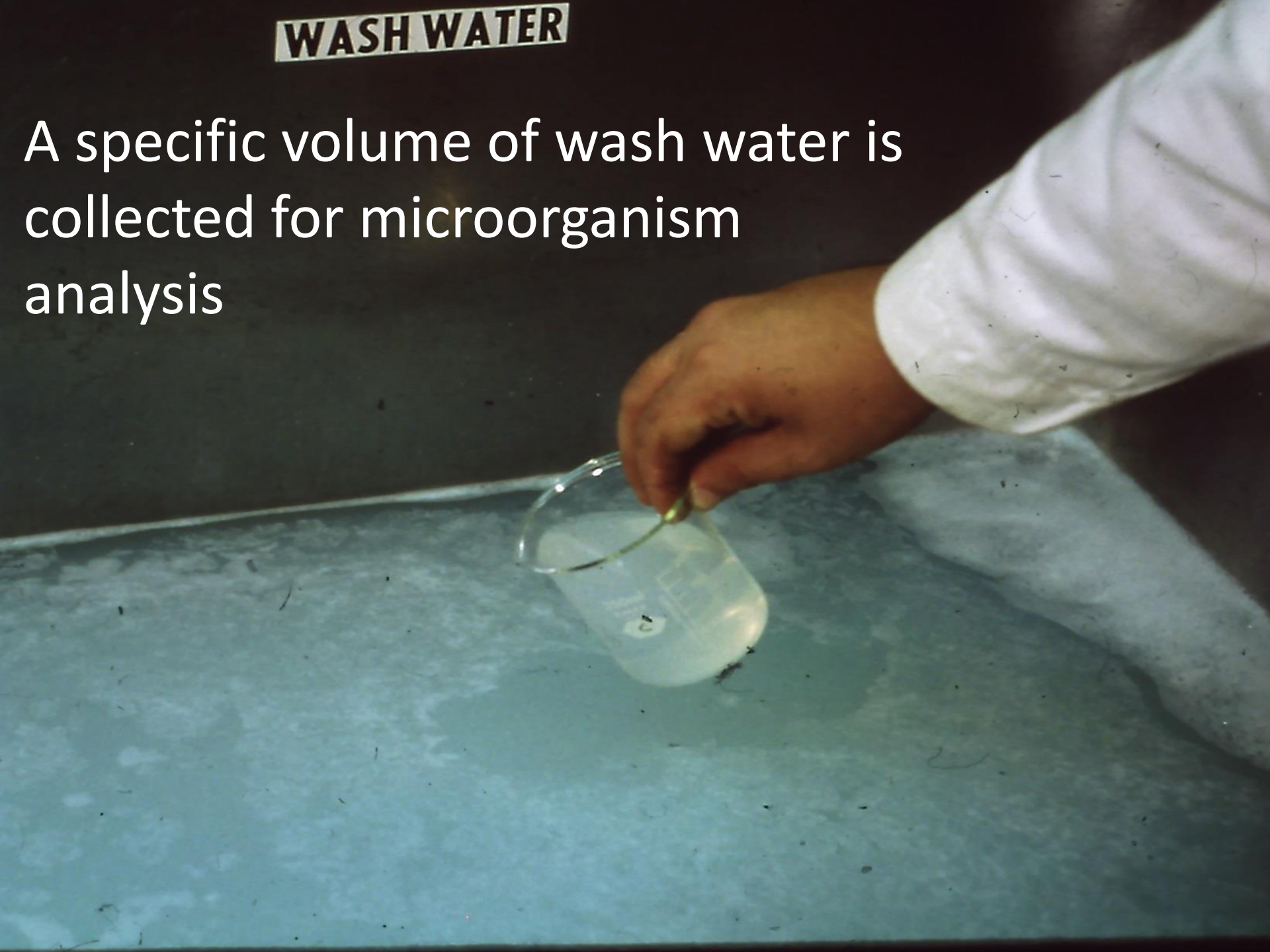
A Specific weight of a solid product is obtained for micro analysis

3

Examples
of liquid
sampling

WASH WATER

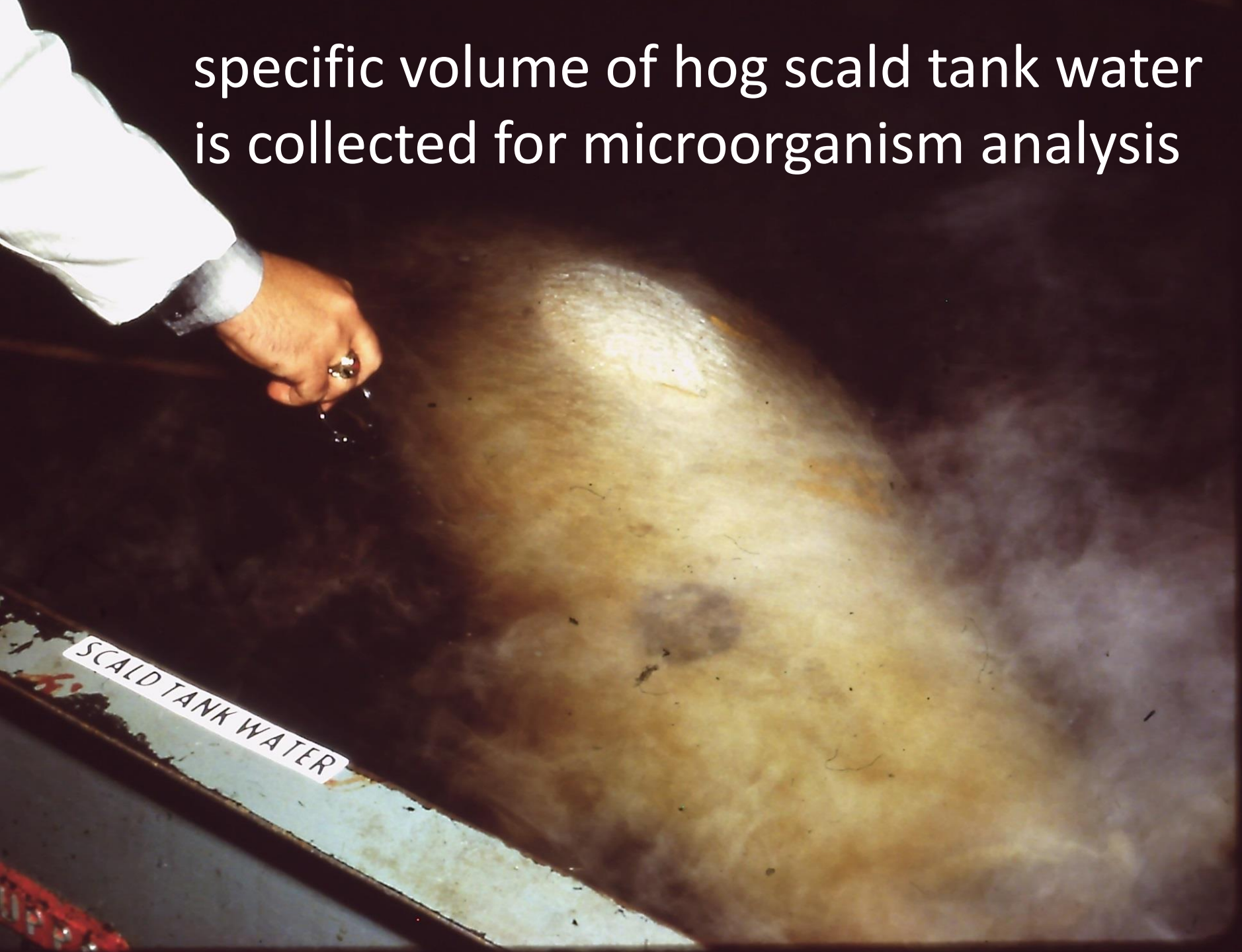
A specific volume of wash water is collected for microorganism analysis



A specific
volume of
hose tap water
is collected
for
microorganism
analysis



specific volume of hog scald tank water
is collected for microorganism analysis



4

Examples of
air sampling

OPEN WINDOW

Air Sample is collected from an open window with a open petri dish containing micro. Agar. Time of exposure needs to be obtained

x



Air Sample is collected from an air vent with a open petri dish containing micro. Agar. Time of exposure needs to be obtained





HOLDING PENS

Air Sample
collected
from an
holding
pen with
a open
petri dish
containing
micro. Agar

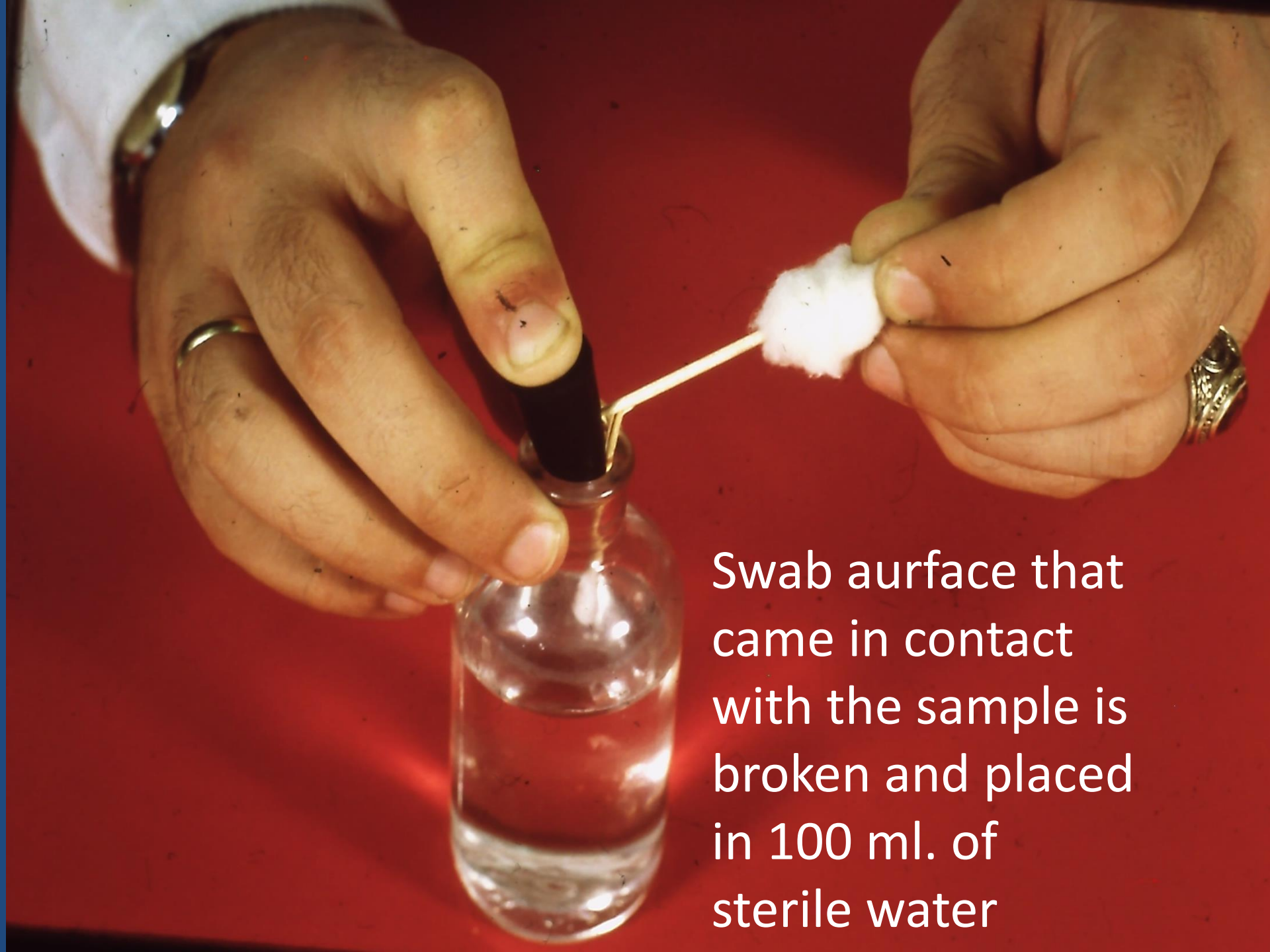
5

Examples
of contact
sampling



Contact analysis with finger
on agar in petri dish

C. Plating techniques



Swab surface that
came in contact
with the sample is
broken and placed
in 100 ml. of
sterile water



The container is shaken to distribute the microorganisms into the 100 ml. of water

10 MILLILITERS



Ten ml of microorganisms +water is removed from the shaken bottle

1 MILLILITER

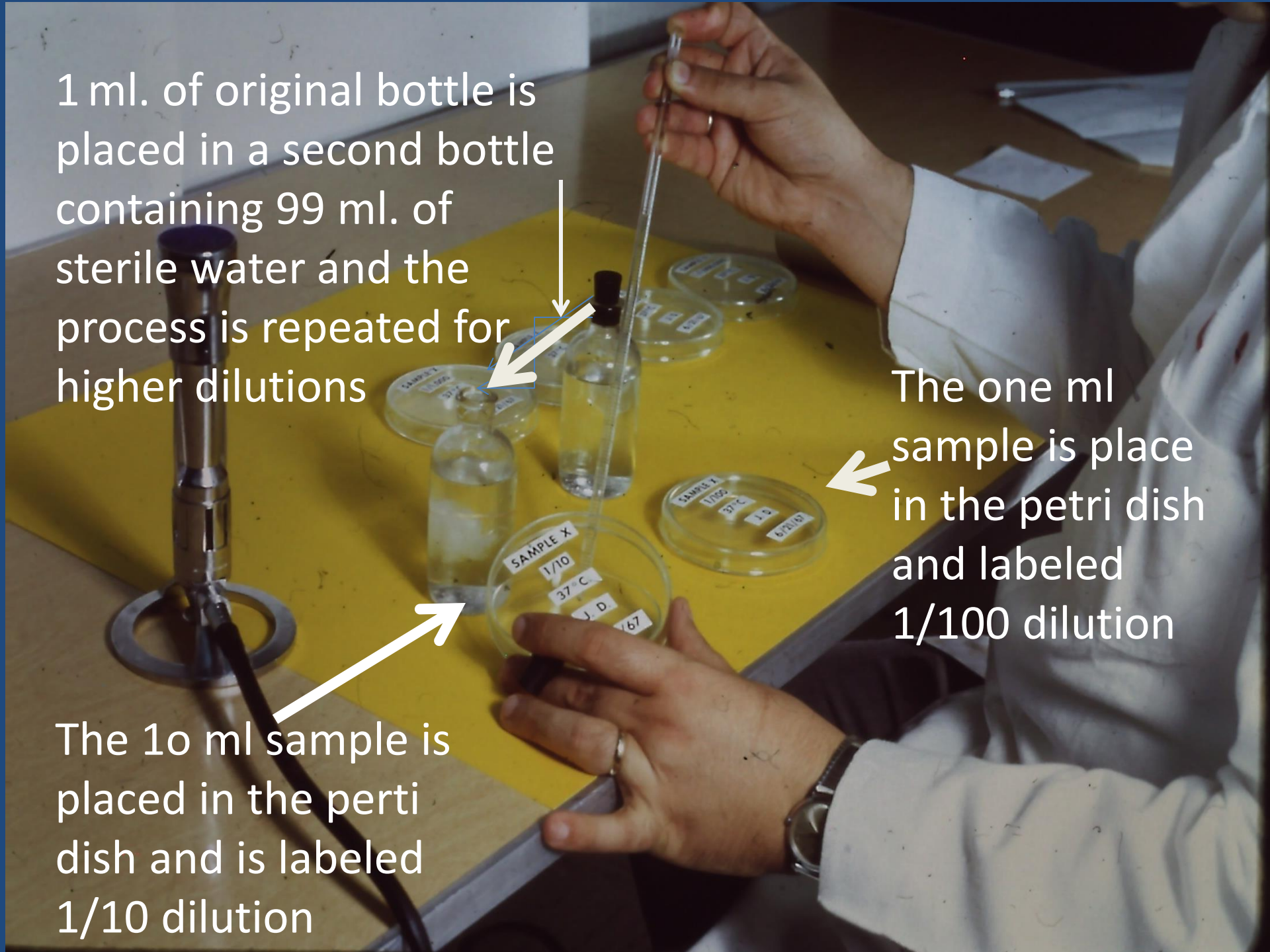


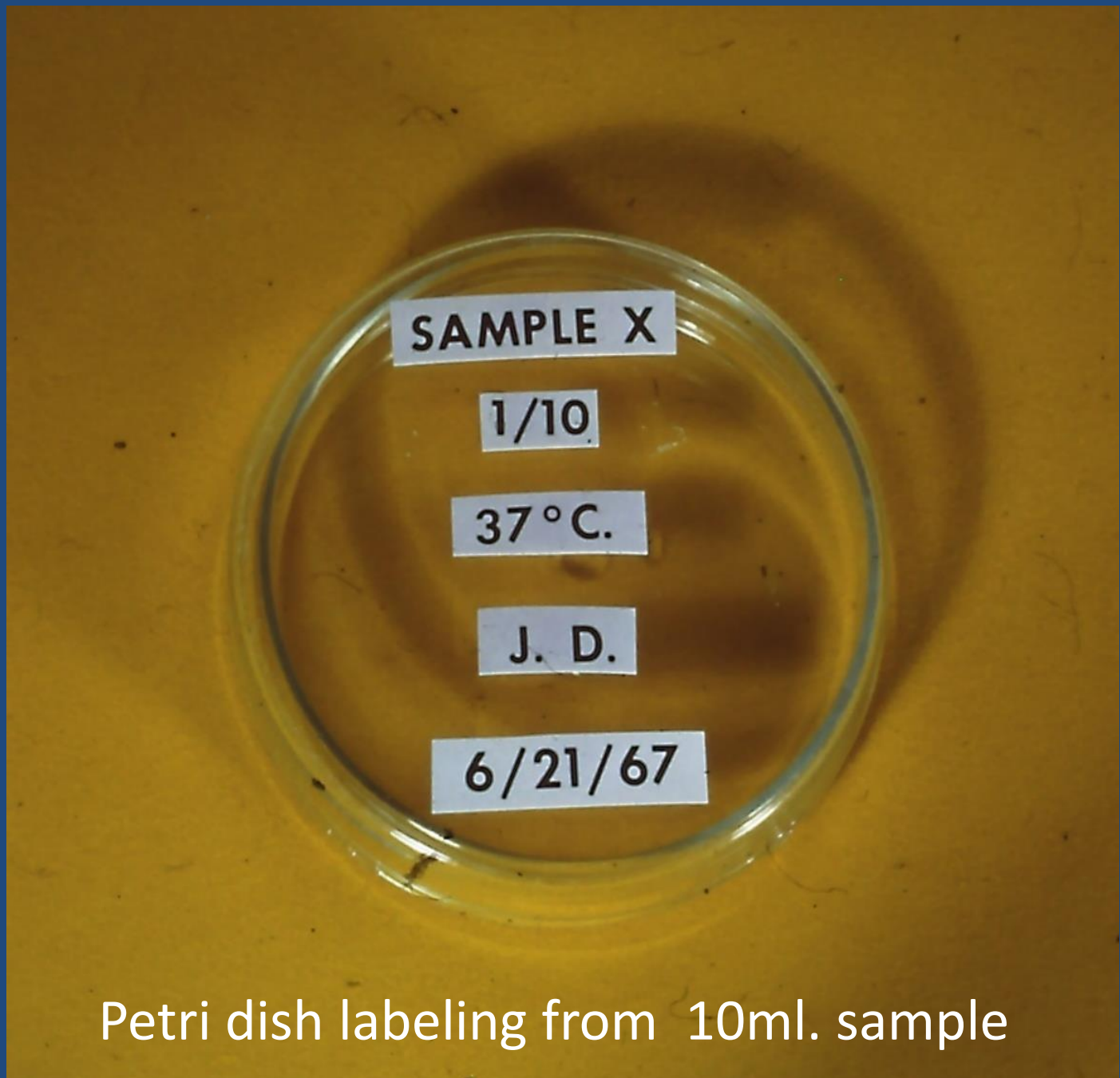
One ml. of the microorganisms + water
is removed from the shaken bottle

1 ml. of original bottle is placed in a second bottle containing 99 ml. of sterile water and the process is repeated for higher dilutions

The one ml sample is placed in the petri dish and labeled 1/100 dilution

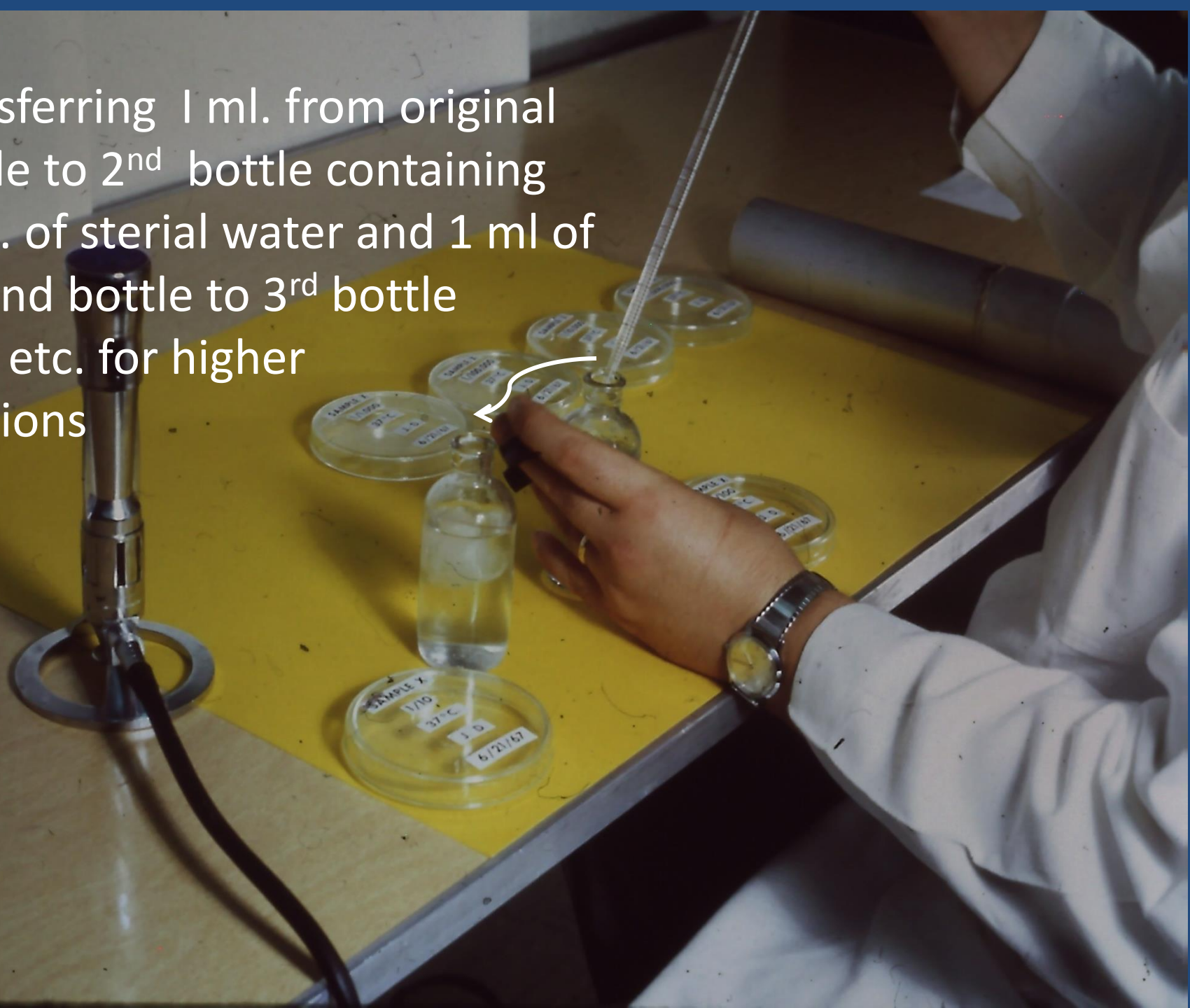
The 10 ml sample is placed in the petri dish and is labeled 1/10 dilution





Petri dish labeling from 10ml. sample

Transferring 1 ml. from original bottle to 2nd bottle containing 99m. of sterial water and 1 ml of second bottle to 3rd bottle and etc. for higher dilutions



Original
Bottle

2nd
Bottle

3rd
Bottle

Etc.

1 ml.

1 ml

100 ml

99 ml

99 ml

10 ml

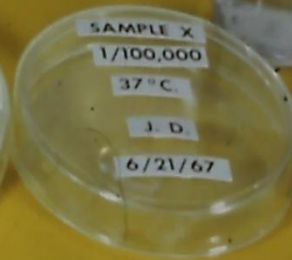
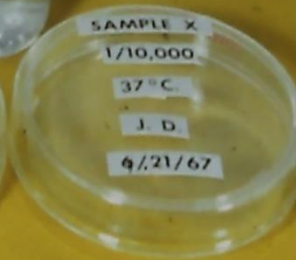
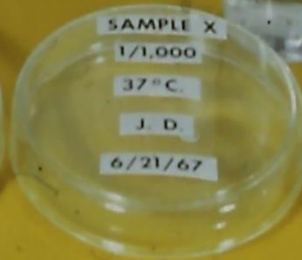
1 ml

10 ml

1 ml

10 ml

1 ml



1/10

1/100

1/1,000

1/10,000

1/100,000

1/1,000,000

Dilution

Adding agar (micro food)
to petri dishes



Labeling petri dishes
for one sample

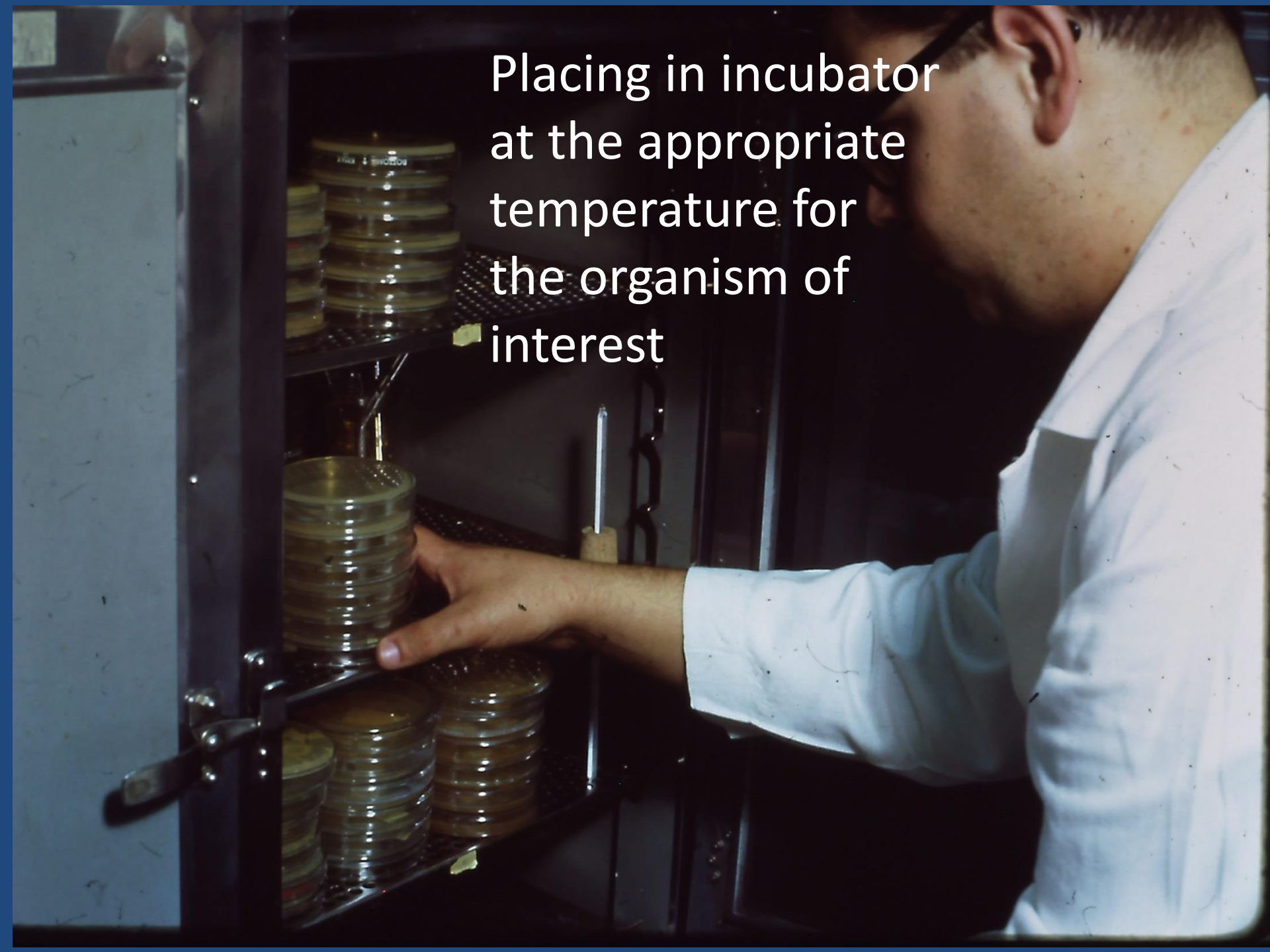


Inverting petri dishes to
control condensation
during incubation



D. Incubation

Placing in incubator
at the appropriate
temperature for
the organism of
interest



3 days of
incubation
are often
used



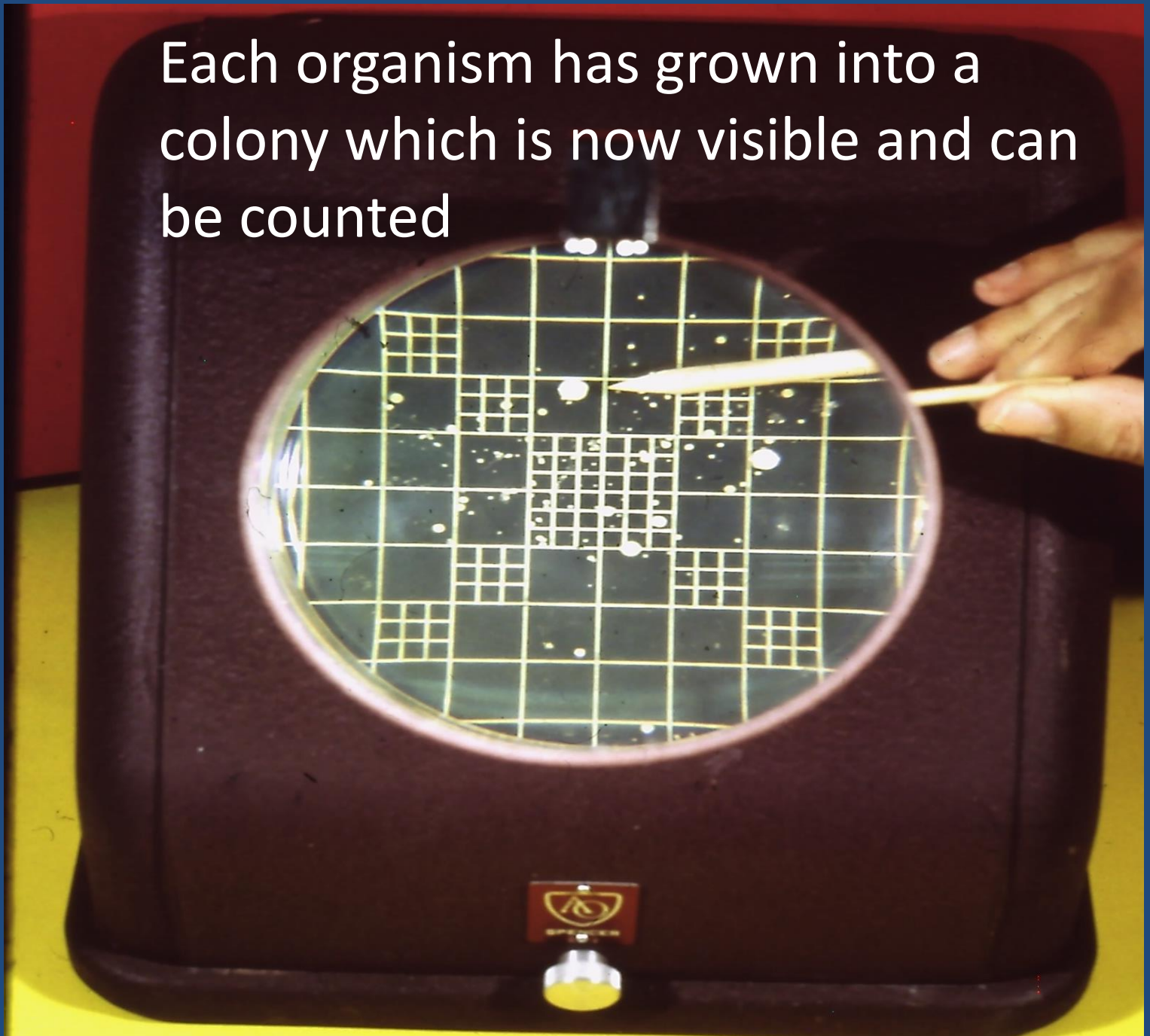
Incubate for appropriate time depending on
organism and temperature of incubation

Removal
from
incubator at
appropriate
incubation
time



E. Colony counting

Each organism has grown into a colony which is now visible and can be counted





Record keeping for count obtained,
type of sample, location
of product sampled,
incubation time and
temperature



F. Analysis

Sample Water Meat Equipment

Dilution Sample Sample Sample

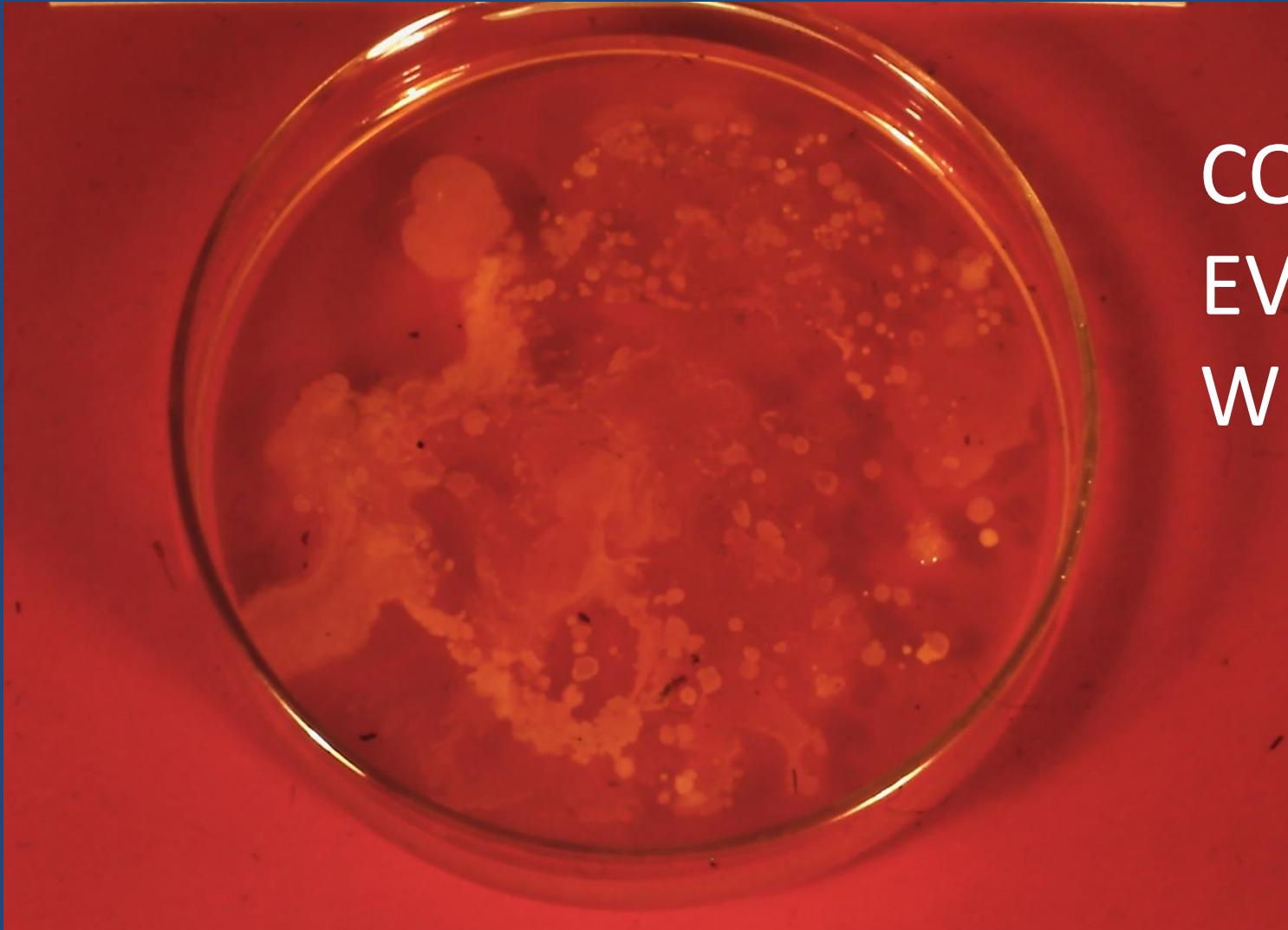
1/10		225	Over 1,000	Over 7,000
1/100		18		150
1/1000		3		12
1/10,000		0		10
1/100,000		0		0
1/1,000,000		0		0
Organisms per Unit		2,250/ Milliliter	15,000/ Gram	75,000 Sq. cm.

Dilutions utilized have a count between 30-300 (blue arrows) which is multiply times the dilution. If the original sample was not one then correct for original sample size is necessary



Dirty hands

Hands dirty



COLONIES
EVERY
WHERE



Hands rinsed, no
soap

Hands rinsed

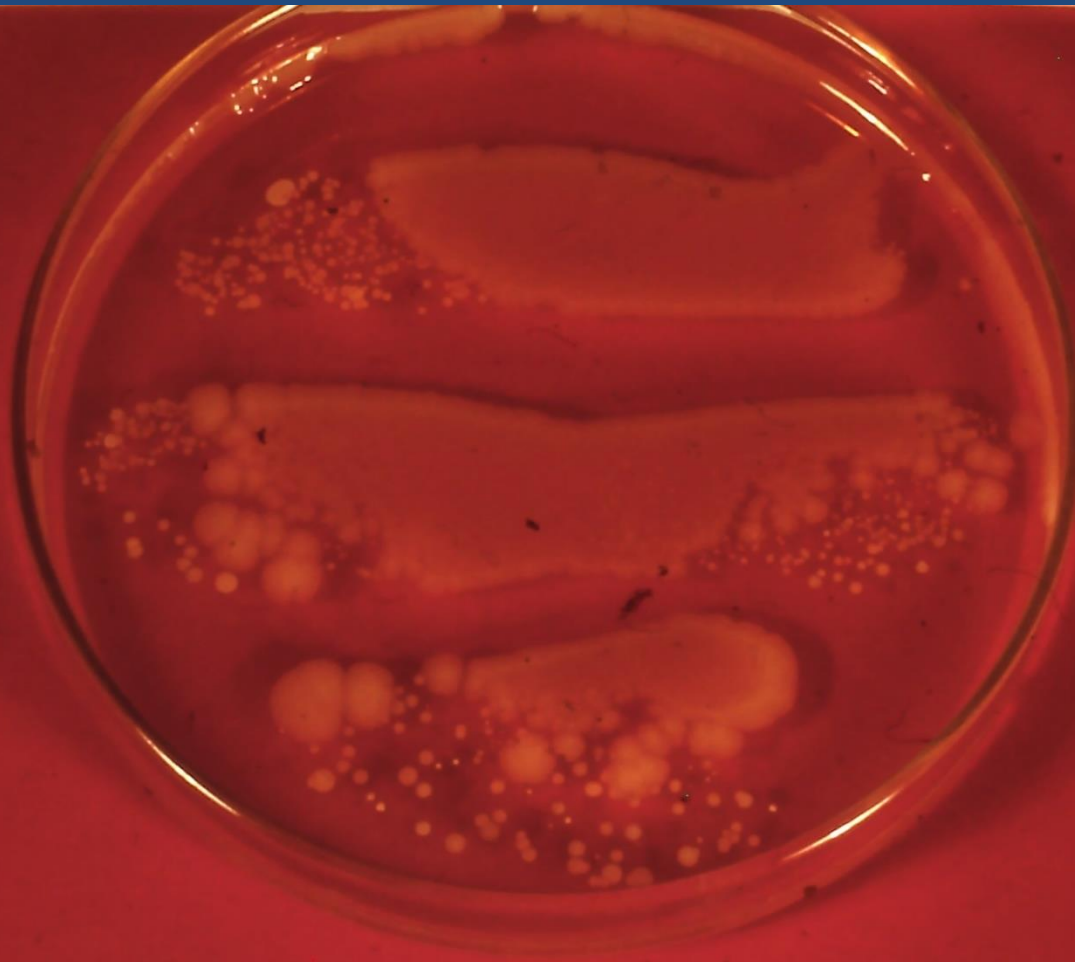


Numbers increased probably due to removal of a biofilm and exposing additional microbes




Using a little soap

Hands 1st wash, little soap



Numbers
reduced
slightly,
but not
much

A person wearing a white lab coat is standing at a sink, washing their hands. Water is running from a chrome faucet into the sink. The person's hands are covered in white soap suds. The sink is set into a dark, possibly black, countertop. In the background, there is a metal rack with various glassware and a red fire extinguisher. The lighting is warm and focused on the hands and the sink area.

Second wash
this time with
more soap

A petri dish containing a bacterial culture on a red agar medium. The culture shows a confluent layer of small, yellowish, circular colonies. The colonies are more densely packed in the center and become more sparse towards the edges. The petri dish is placed on a red surface.

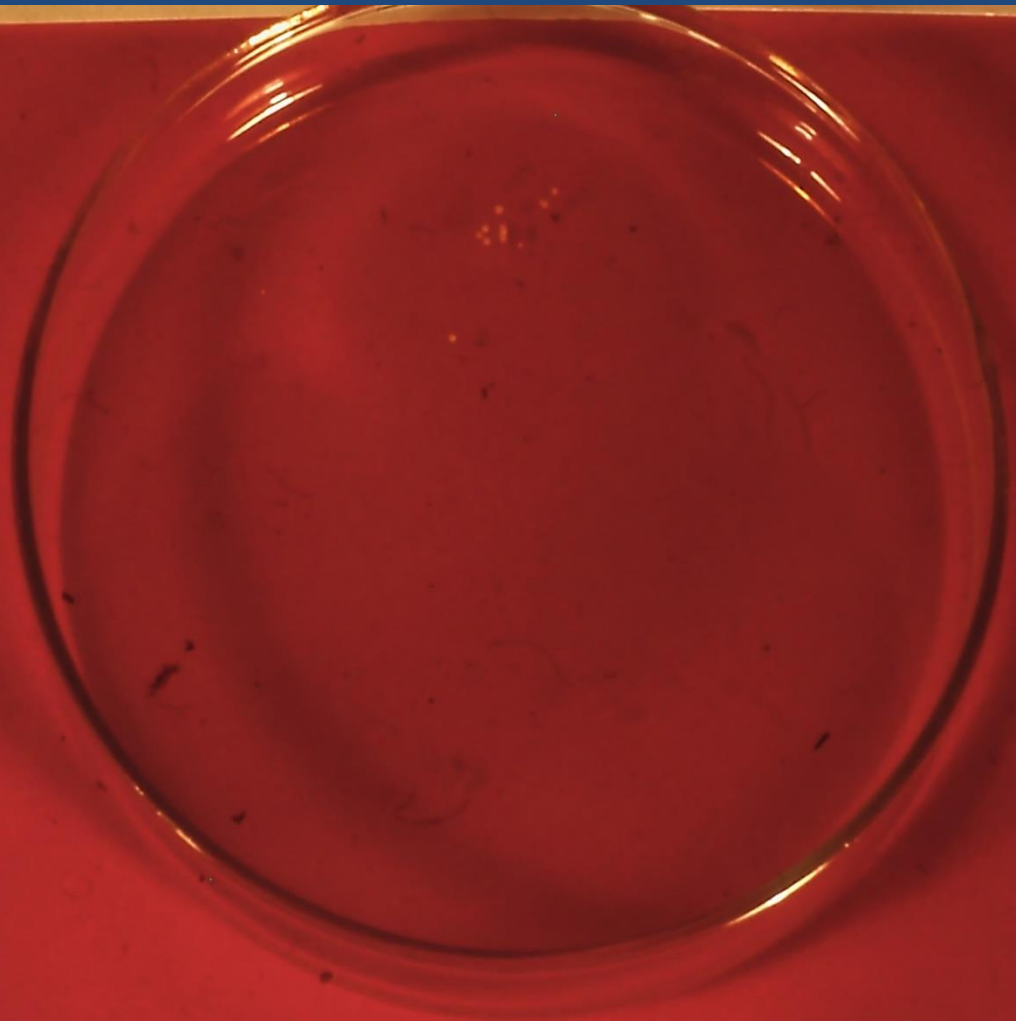
Hands second
wash,
improved but
still
contaminated



Hands now
sanitized

Hands, rinsed, 2 washes and sanitized

Almost
perfect



HANDS DIRTY

HANDS RINSED



#1

#2

HANDS SECOND WASH



#3

#4

#5



Hands first wash

Hands sanitized

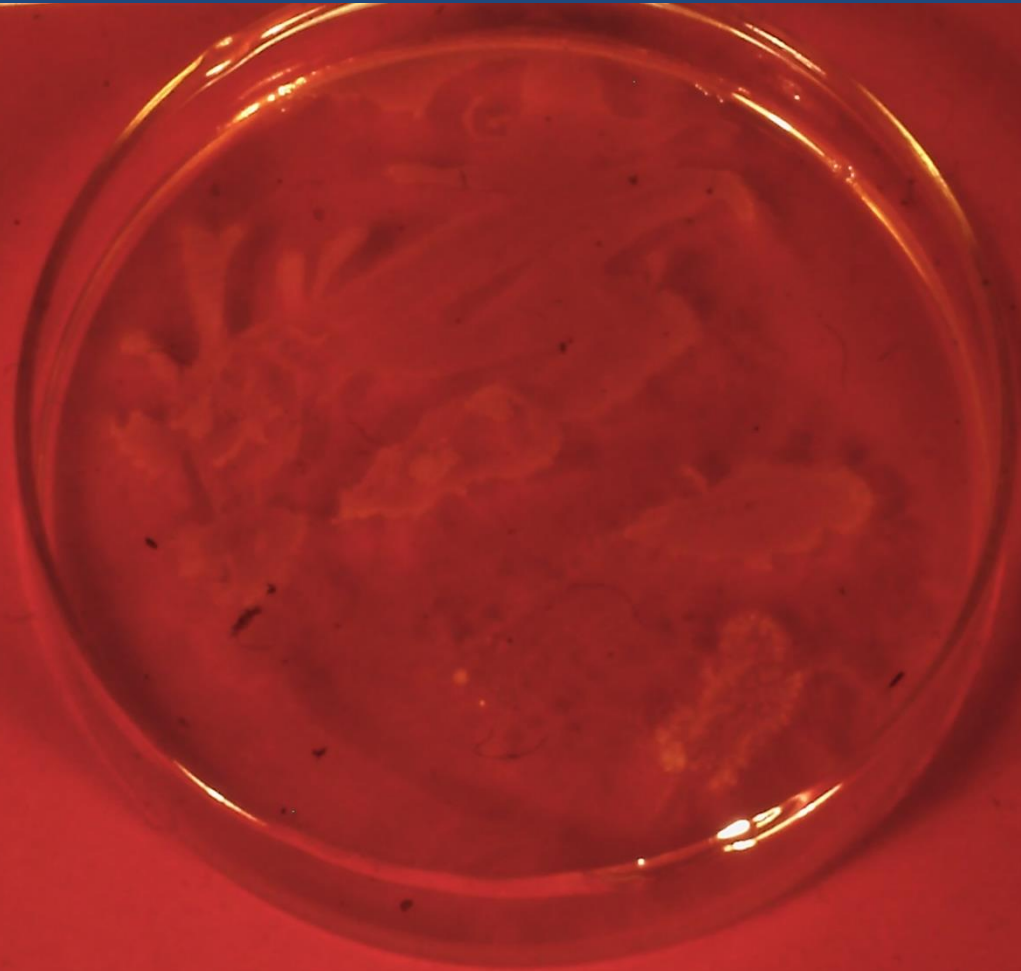
Dirty

GLOVES



Dirty gloves

Too Many
colonies
to count

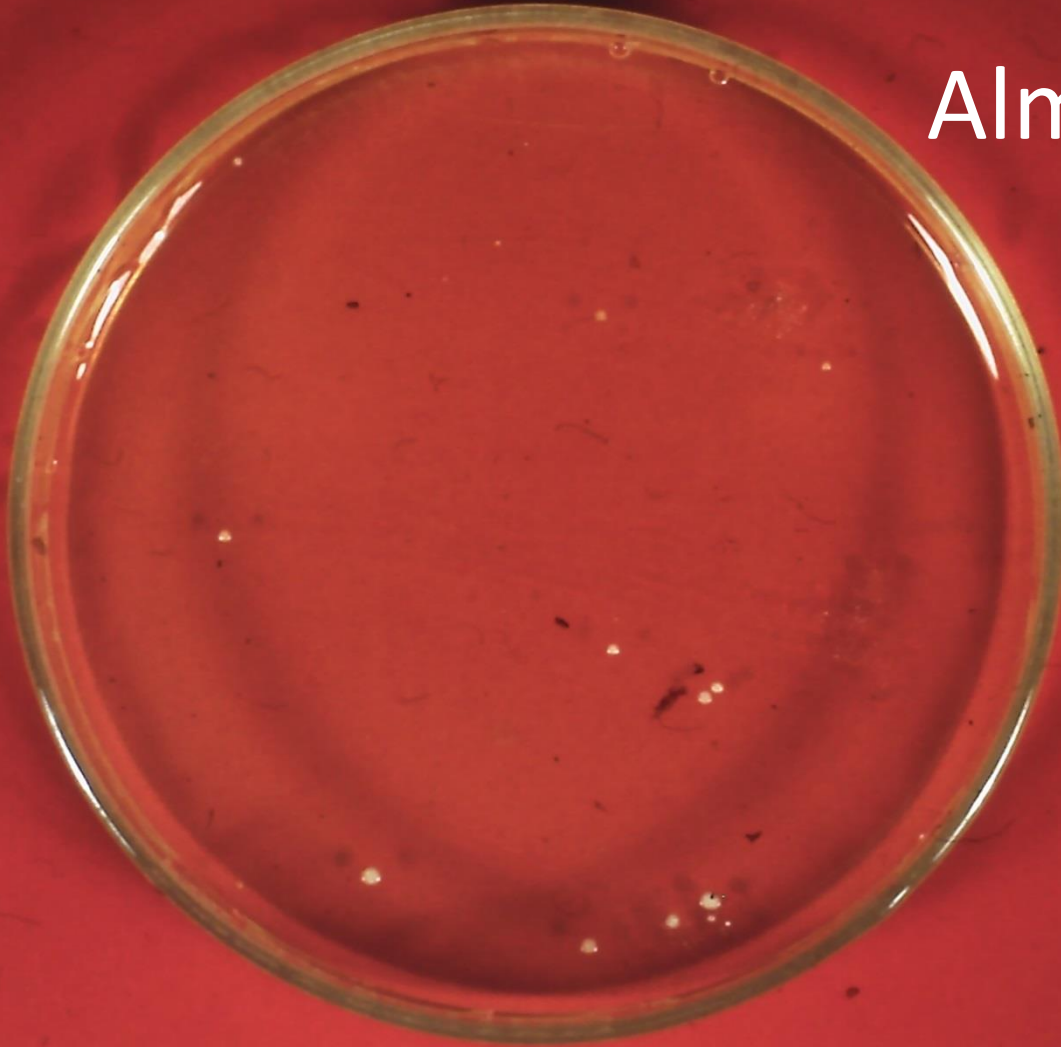


Clean

GLOVES



CLEAN GLOVES



Almost sterile

PLASTIC GLOVES



Clean gloves – no contamination
However, upon usage the external will
become contaminated



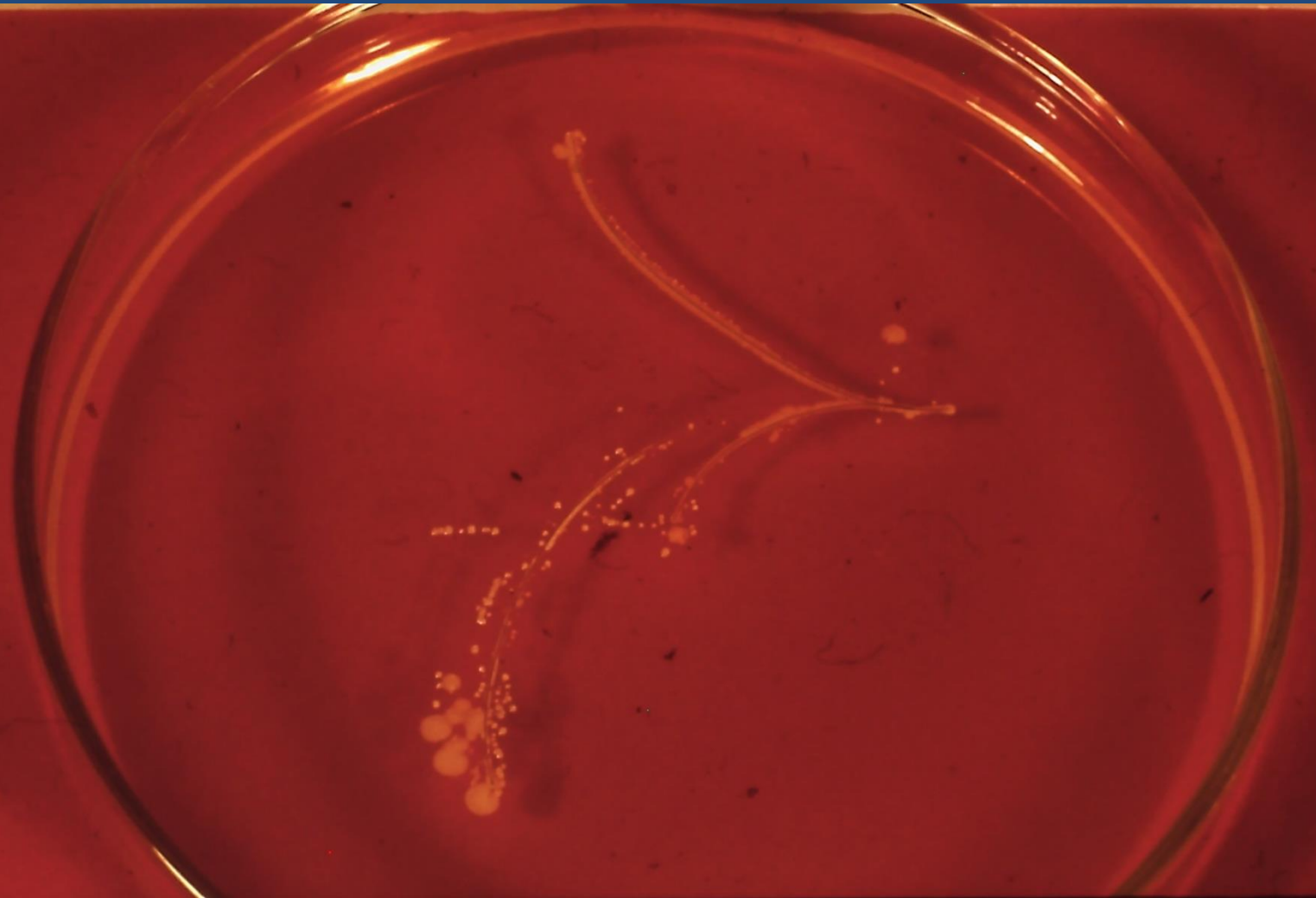
Dirty sneeze

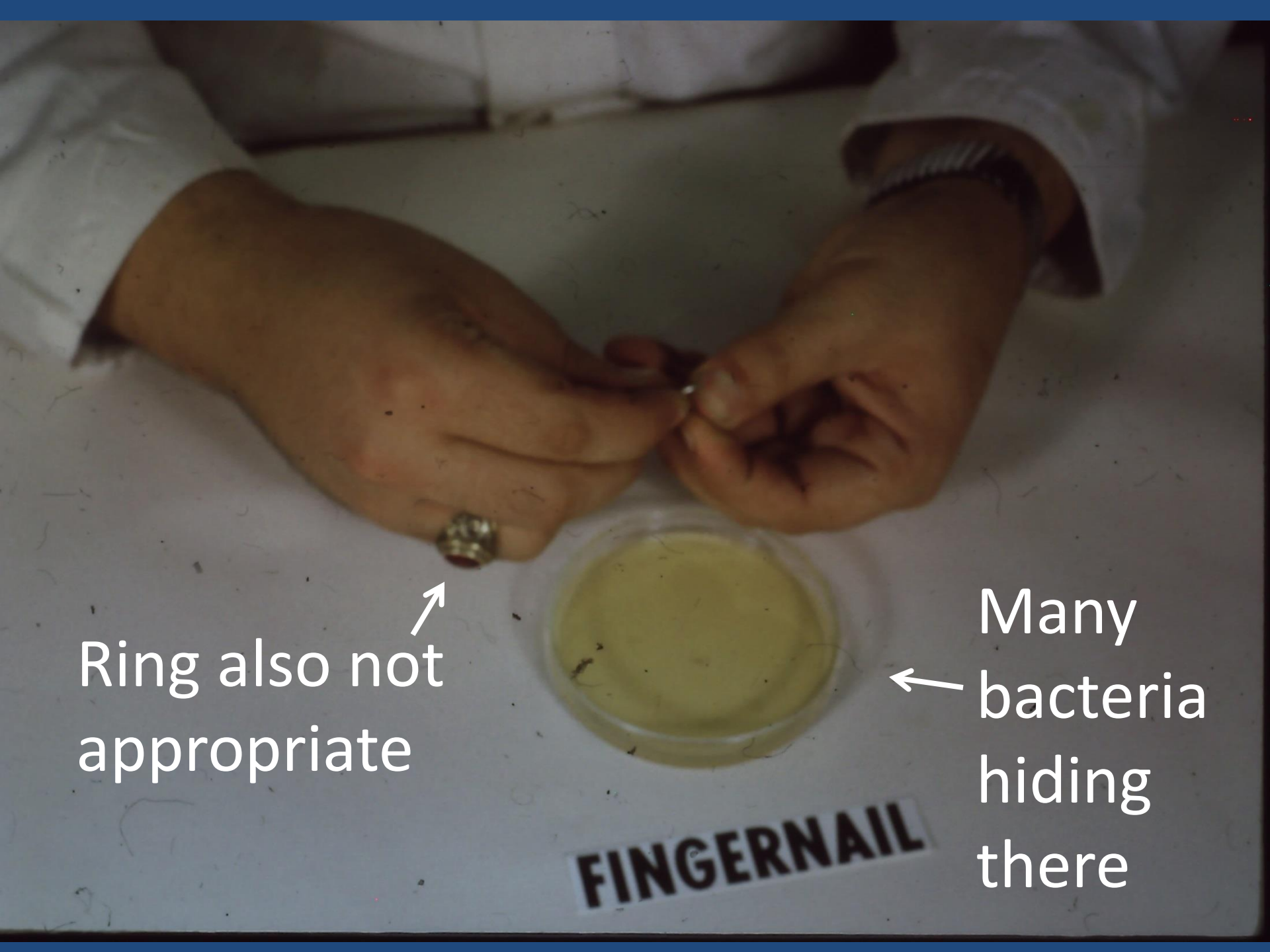
Plate is
covered
with
colonies



2 Human hairs that was recently washed.

HAIR NET **IMPORTANT**



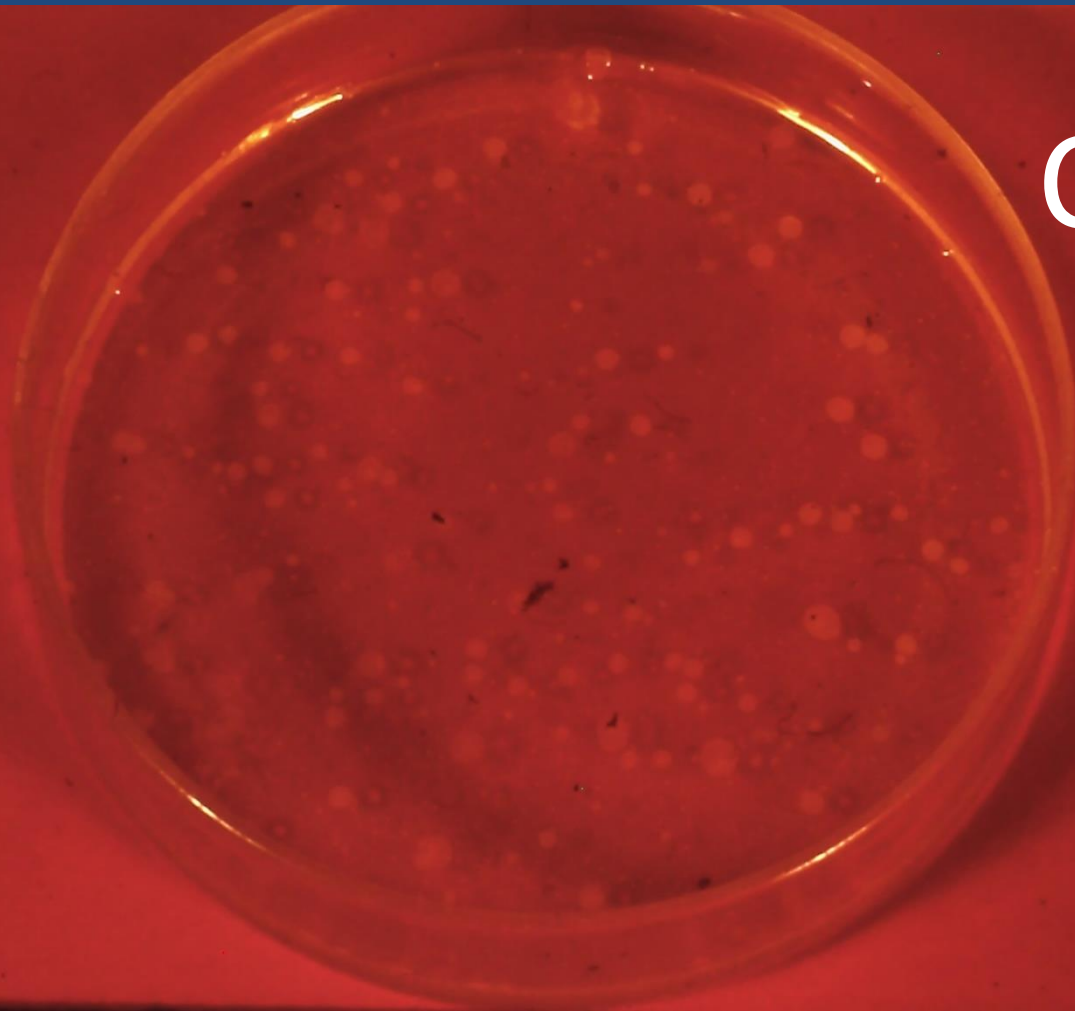


Ring also not
appropriate

FINGERNAIL

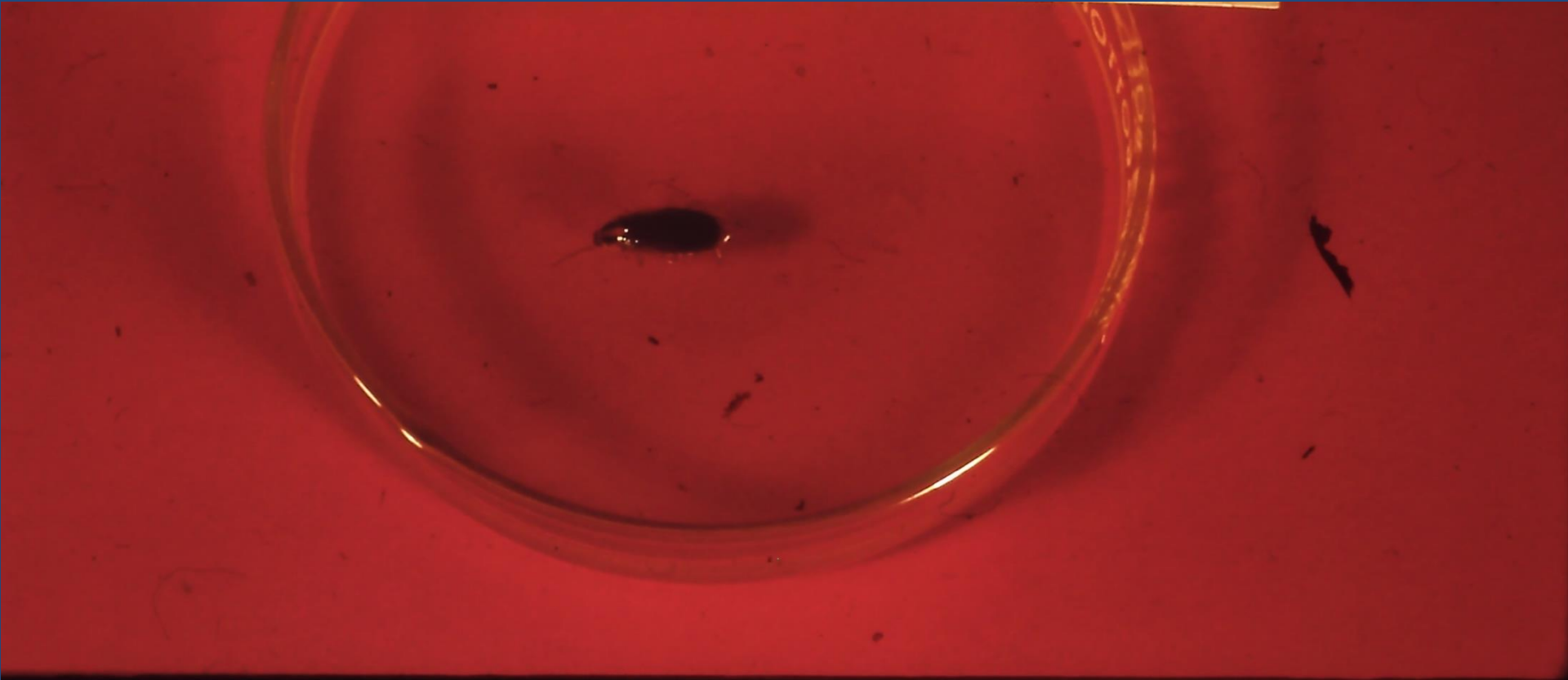
Many
bacteria
hiding
there

Fingernail



Colonies
cover
plate

Cockroach strolled across plate



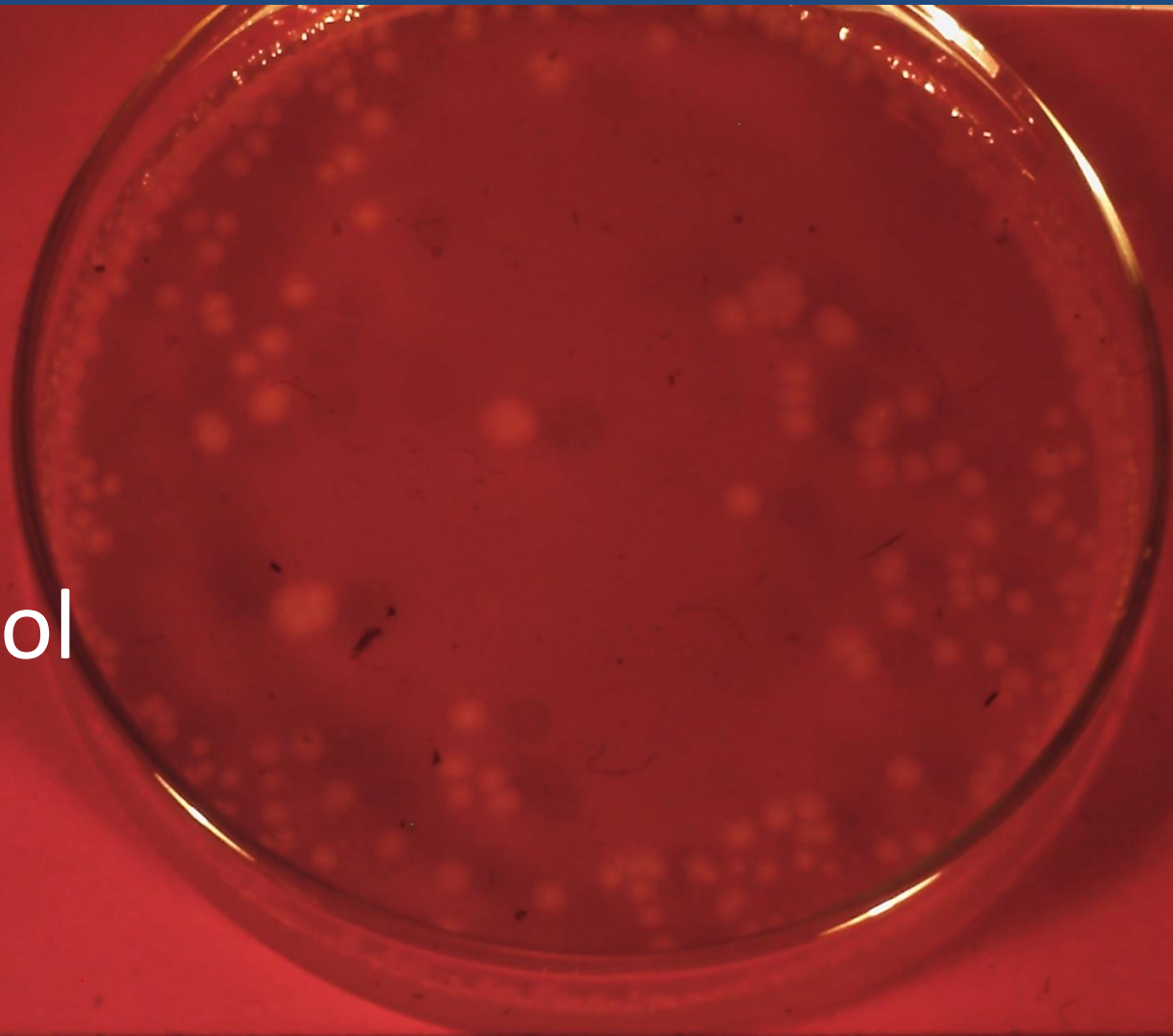
Cockroach Tracks across plate



Pest
control is
important

Fly strolled around plate

Fly control
is critical



SUMMARY

- a) Proper housecleaning followed by washing and sanitizing...
- b) Keeping equipment clean at all times which includes frequent clean-up...
- c) Personal hygiene is a must...
- d) Pest control is extremely essential...
- e) Additives can be helpful or a hindrance in maintaining microbiological control...
- f) Temperature control is an essential portion of sanitary control...